

**AP® BIOLOGY**  
**2008 SCORING GUIDELINES (Form B)**

**Question 3**

3. Evolution is one of the unifying themes of biology. Evolution involves change in the frequencies of alleles in a population. For a particular genetic locus in a population, the frequency of the recessive allele ( $a$ ) is 0.4 and the frequency of the dominant allele ( $A$ ) is 0.6.

- (a) What is the frequency of each genotype ( $AA$ ,  $Aa$ ,  $aa$ ) in this population? What is the frequency of the dominant phenotype?

Calculations **(4 points maximum)**

- Frequency  $AA = .36$
- Frequency  $Aa = .48$
- Frequency  $aa = .16$
- Frequency dominant phenotype = .84

(Correct equation needed for credit if one of calculated numbers is wrong.)

- (b) How can the Hardy-Weinberg principle of genetic equilibrium be used to determine whether this population is evolving?

Evolving population **(2 points maximum)**

- Allelic frequency changes or five conditions that do not change if population is not evolving
- Means of measurement/detection

- (c) Identify a particular environmental change and describe how it might alter allelic frequencies in this population.

Explain which condition of the Hardy-Weinberg principle would not be met. **(4 points maximum)**

- Environmental change identified **(1 point)** (first one scored)
- Explanation of how allelic frequency changed **(1–2 points)**
- Which Hardy-Weinberg condition not met **(1 point)**